



Evaluation of Highly Realistic Training for Independent Duty Corpsmen Students

Stephanie Booth-Kewley

Renee Dell'Acqua

Isabel Altarejos

Stephanie McWhorter



Naval Health Research Center

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Naval Health Research Center

140 Sylvester Rd.

San Diego, California 92106-3521

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Stephanie Booth-Kewley, Renée Dell'Acqua, Isabel Altarejos, & Stephanie McWhorter

*Health and Behavioral Sciences Department
Naval Health Research Center, San Diego, CA*

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Executive Summary

Highly realistic training for Navy corpsmen simulates real-life operational situations with the use of battlefield scenarios, live actors, cut suits, and pyrotechnics. In this study, a sample of corpsmen students attending the Surface Force Independent Duty Corpsman School in San Diego participated in highly realistic training. The objectives of this study were to (1) assess the corpsmen participants' satisfaction with highly realistic training, and (2) determine the impact of highly realistic training on participants' self-efficacy, perceived readiness, and career intentions. Corpsmen participants expressed high levels of satisfaction with the training overall and with specific elements of the training. Comparisons of pretest and posttest survey responses revealed that the training produced significant increases in participants' levels of occupational, and task-specific self-efficacy, as well as their perceived readiness. Overall, these results suggest that highly realistic training is a useful and effective method for training corpsmen. It is suggested that highly realistic training be extended to other populations of military medical providers.

INTRODUCTION

Based on the success of the Infantry Immersion Trainer developed for infantry personnel (sponsored by the Office of Naval Research in 2007 and 2008), the highly realistic training method was adapted for Navy corpsmen. Highly realistic training for Navy corpsmen simulates real-life operational situations with the use of battlefield scenarios, live actors, and pyrotechnics. Each scenario, constructed by subject matter experts, is designed to replicate situations corpsmen are likely to encounter in combat. The actors used in the training are instructed to display physical and psychological symptoms appropriate for their assigned medical condition (e.g., respiratory distress, shock, blast wound). In an effort to add greater realism to the training, most actors wear a device called a cut suit, which consists of a false torso worn over the actor's real torso. The cut suit technology provides participants the unique opportunity to practice medical procedures such as chest tube insertion, hemorrhagic control, and needle thoracentesis. In addition, several actors are actual amputees, some of whom were injured in combat. Essentially, highly realistic training requires corpsmen to demonstrate their mastery and proficiency of hands-on trauma care while under stressful and demanding conditions.

In this study, highly realistic training was implemented and evaluated in a sample of Navy corpsmen attending the Surface Force Independent Duty Corpsman School (IDC School) in San Diego, California. IDC School is a year-long course, consisting of 9 months of didactic classroom training followed by 3 months of clinical training. Completion of training at IDC School provides corpsmen with the Navy Enlisted Classification of HM-8425 (Surface Force Independent Duty Corpsman).

Independent Duty Corpsmen (IDCs) are specialized Navy corpsmen who serve as primary medical care providers and medical department representatives across a diverse range of duty stations, including surface ships, submarines, Marine infantry units, Special Warfare units, hospitals, clinics, and isolated Navy and Marine Corps shore units. IDCs are trained to work independently, without direct supervision, and to perform advanced-level patient care including Tactical Combat Casualty Care (TCCC) and trauma care in operational settings.

Working in operational settings presents corpsmen with enormous challenges while they seek to provide quality medical care under conditions that may be dangerous, harsh, nonsterile, and contain limited equipment and supplies. Navy corpsmen who work in operational settings are unique in that they are exposed to a double burden of stress: imminent threat to their personal safety and the responsibility of caring for injured and ill service members. As such, highly realistic training may prepare IDCs for the situations and conditions they are likely to encounter while deployed to combat zones and other operational environments.

Based on the research literature, we expected that highly realistic training would increase corpsmen participants' self-efficacy, perceived readiness, and career intentions. Self-efficacy refers to an individual's feeling of confidence that he or she can perform desired actions or behaviors (Bandura, 1977). In the present study, three types of self-efficacy were assessed: general self-efficacy (the corpsmen's general sense of confidence), occupational self-efficacy (the corpsmen's sense that they will be successful in their occupation), and task-specific self-efficacy (the corpsmen's sense that they can successfully perform their medical skills). We

expected that participating in highly realistic medical training would lead to increases in all three types of self-efficacy (general, occupational, and task-specific) in this sample of Navy corpsmen. In addition, we expected that highly realistic training would increase participants' sense of readiness—their sense of being prepared to provide medical care in an operational setting. We also expected that the training would strengthen the participants' career intentions—their long-term plans to stay in the Navy.

The objectives of this study were to (1) assess the corpsmen participants' satisfaction with highly realistic training, and (2) assess the impact of highly realistic training on participants' self-efficacy (i.e., confidence), readiness, and career intentions. We expected that participants would generally express a high level of satisfaction with the training and that the training would lead to a significant increase in the participants' self-efficacy, readiness, and career intentions.

METHODS

Sample

The sample consisted of 290 male and female Navy service members. All participants were Navy corpsmen who were enrolled in the Surface Force Independent Duty Corpsman School in San Diego.

The sample was predominantly male (84.1%). Age of study participants ranged from 20 to 43 (mean of 30.0 years). Tenure in the Navy ranged from 4 to 16 years (mean of 9.0 years). All participants were enlisted (i.e., none were officers). All of the participants were in paygrades E-5 (59.4%), E-6 (37.1%), or E-7 (3.5%). The participants were predominantly non-Hispanic White (54.3%), with smaller proportions of Black (12.9%), Asian (8.4%), Hispanic (6.6%), and "mixed or multiple races" (17.8%). Participants' number of deployments (lasting 30 days or longer) ranged from 0 to 8, with a mean of 2.2.

Description of the Training

This project provided highly realistic, immersive training to corpsmen students enrolled in IDC School between February 2013 and December 2014. The training was part of the corpsmen students' final exercise for the trauma unit of their IDC course. The highly realistic training took place at Strategic Operations, Inc., a television and film studio in San Diego. The training was based on preplanned scenarios developed by subject matter experts (IDCs who had been deployed to combat). The studio sets used in the training were designed to simulate real-life military settings (such as a ship, a village in a combat zone, and a flight deck).

The training scenarios involved actors who played the role of patients with specific medical problems (e.g., uncontrolled bleeding, respiratory distress, blast wound) and who interacted with training participants while receiving medical care. For example, some actors yelled or screamed and resisted treatment. In the training scenarios, the corpsmen participants had to react appropriately to one or multiple mock trauma casualties. Some of the actors used in the training

were actual amputees. In addition, some of the actors wore cut suits, which allowed participants to practice hands-on medical care (e.g., insertion of chest tubes, control of bleeding). Special effects (e.g., smoke, explosions, sirens) were used in the scenarios to replicate the sights, sounds, and smells of combat. The overall goal of the training was to test the IDC students' ability to use their TCCC skills, as well as their overall ability to manage and supervise both single and mass casualty situations.

The highly realistic training took place over the course of 2 days (approximately 16 hours total). During the training, each student participated in approximately 10–12 different scenarios in groups of 4–6 students at a time. After each training scenario, instructors debriefed the students, giving them feedback on their mastery of medical care and infantry skills. Students who did not perform adequately in a given scenario had the opportunity to repeat the scenario until critical elements were mastered. Instructors also worked with students on a one-on-one basis to practice specific skills until they mastered them.

Procedures

To evaluate the impact of the training, corpsmen participants were asked to complete pretest and posttest surveys. Pretests were completed about 1–2 weeks before the training; posttests were administered about 1 week after the training. Thus, the time interval between the pretest and posttest surveys was approximately 2–3 weeks. Both surveys were completed in classroom settings at the IDC School. To allow for matching pretests and posttests, the surveys were not anonymous; participants' names were requested, but confidentiality was assured.

Participation in the study was voluntary, and signed consent was provided by the participants. All corpsmen students received the training as part of IDC School, regardless of whether they participated in the research (i.e., completion of pretests and posttests). All study procedures were approved by Naval Health Research Center's institutional review board.

Measures

The pretest survey assessed demographics, self-efficacy (general, occupational, and task-specific), perceived readiness, career intentions, and other factors. The posttest survey assessed the same factors as the pretest, in addition to items evaluating satisfaction with the training, perceived benefits of the training, and other factors. Measures included in both pretests and posttests allowed for the examination of changes in these factors over time.

General self-efficacy. General self-efficacy is an individual's feeling of confidence that he or she can perform desired actions and can successfully cope with a broad range of challenging situations and demands. We assessed general self-efficacy with the widely used 10-item General Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). We used a different response scale than is used in the original GSE. Whereas the original GSE uses a 4-point response scale, we presented each item with a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). Sample items included: "I can usually handle whatever comes my way" and "I can

solve most problems if I invest the necessary effort.” A general self-efficacy scale score was created by summing across all scale items. For the present sample, the coefficient alpha assessing internal consistency was 0.93 for both the pretest and the posttest.

Occupational self-efficacy. Occupational self-efficacy is an individual’s feeling of confidence that he or she can execute the skills and duties required by his or her occupation. A scale assessing occupational self-efficacy for corpsmen was developed specifically for this study (9 items). Each item is rated on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). Sample items included: “I am confident that I will be able to provide quality medical care under pressure” and “I am confident that I will be able to work well in a team environment.” An occupational self-efficacy scale score was formed by summing across all scale items. The coefficient alphas for the present sample were 0.95 for the pretest and 0.94 for the posttest.

Task-specific self-efficacy. Task-specific self-efficacy is an individual’s sense of confidence that he or she can execute specific tasks related to his or her occupation. A scale assessing task-specific self-efficacy was developed specifically for this study (28 items). The scale consists of items asking participants to rate how confident they feel about performing specific medical skills that are considered core competencies for IDCs. Each item is rated on a 5-point scale ranging from 1 (*I don’t think I can do it*) to 5 (*I’m very sure I can do it*). Sample items included: “Rate how sure you are that you could manage a mass casualty triage” and “Rate how sure you are that you could perform or manage respiratory trauma.” A task-specific self-efficacy scale score was created by summing across all scale items. The coefficient alphas for the present sample were 0.96 (pretest) and 0.97 (posttest).

Career intentions. Career intentions were assessed using a single item: “If you could stay on active duty as long as you want, how likely is it that you would serve in the Navy as a corpsman for at least 20 years?” Responses were made on a 5-point scale, ranging from 1 (*very unlikely*) to 5 (*very likely*). This item was adapted from a career intentions item that has been widely used in other military surveys.

Perceived readiness. Perceived readiness was measured using a 7-item scale that was developed specifically for this study. Each item is rated on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). Sample items included: “Rate the degree to which you feel prepared to be assigned to a ship as the primary or only medical provider” and “Rate the degree to which you feel prepared to not choke or make mistakes.” A perceived readiness scale score was created by summing across all scale items. The coefficient alphas for the present sample were 0.85 (pretest) and 0.83 (posttest).

Training satisfaction and perceived benefits of the training. Items assessing satisfaction with the training and perceived benefits of the training were developed specifically for this study. Sample items included: “The training was a good test of my overall IDC skills set” and “Did the training strengthen your confidence about your ability to provide medical care?” The survey also included the following open-ended questions: “What did you like the most about the training?” and “What suggestions do you have for improving the training?”

Demographics. The pretests and posttests asked for information on participants' gender, age, race/ethnicity, paygrade, and tenure in the Navy.

RESULTS

Satisfaction With the Training

In the posttest, IDC students were asked about their overall satisfaction with the training and their satisfaction with specific aspects of the training. Satisfaction with the training overall was high, with a mean rating of 4.21 on a 5-point scale (Table 1). This indicated an average rating falling between "good" and "excellent." The majority of the participants gave the training a global rating of "excellent" (44.3%) or "good" (36.7%). Mean ratings of specific elements of the training were also fairly high; they ranged from a high of 4.44 for the use of role players/actors to a low of 4.04 for the shipboard settings.

One set of items on the posttest asked respondents to assess perceived benefits of the training. Respondents rated five different factors: (1) their overall confidence about being a successful IDC, (2) their ability to perform in an operational environment, (3) their ability to provide medical care under pressure, (4) their TCCC skills, and (5) their higher-level IDC skills. The response scale for this set of items ranged from 1 (*not at all*) to 5 (*extremely*). These results are shown in Table 2. For all five of these items, the majority of the respondents stated that the training had been "extremely" or "very" beneficial. Mean ratings for the benefits of the training were high for all factors, ranging from 4.30 for higher-level IDC skills to 4.03 for TCCC skills.

The posttest included other questions assessing participants' satisfaction with the training (see Table 3). The majority of the sample either strongly agreed (53.0%) or agreed (28.0%) with the item, "I really enjoyed the training and would like to participate in additional trainings like it." Most respondents strongly agreed (41.3%) or agreed (34.8%) that "The training was a good test of my overall IDC skills set." Similarly, most participants believed that the training had strengthened their confidence in their ability to provide medical care, and most agreed that the training would help them to provide better care as an IDC (Table 3).

The posttest included the following open-ended questions: "What did you like the most about the training?" and "What suggestions do you have for improving the training?" Representative responses to these questions are shown in Table 4. In response to the question asking participants what they liked the most about the training, the most common themes were the use of live actors, cut suits, ability to practice hands-on medical procedures, and realistic environment. A representative comment was, "Instructor feedback, cut suits, and being able to see and actually do treatments on real breathing people." Another typical comment was, "The ability to work on a patient who can speak to you and show emotions."

In response to the question "What suggestions do you have for improving the training?," the most common themes were that the training should be longer, with more varied scenarios, actors, and medical supplies (Table 4). A representative comment was "Make scenarios longer

with realistic timelines of effective treatment.” Another comment was, “Add more people (actors) in the towns.”

Impact of the Training on Self-Efficacy, Readiness, and Career Intentions

An important objective of this study was to determine the impact of highly realistic training on participants’ level of self-efficacy (i.e., confidence), perceived readiness, and career intentions. Paired sample *t* tests were performed to determine if pretest and posttest scores differed significantly for the following variables: self-efficacy, perceived readiness, and career intentions. These results are shown in Table 5.

Consistent with our expectations, scores on occupational self-efficacy and task-specific self-efficacy were significantly higher after the training than before (*p*’s < 0.01). The increase from pretest to posttest was particularly large for the task-specific self-efficacy scale, which measured participants’ confidence about performing specific medical procedures. The scores on the task-specific self-efficacy scale increased from a mean of 110.36 to a mean of 129.06. For general self-efficacy, the increase from pretest to posttest was marginally significant (*p* = 0.056).

The analysis revealed that perceived readiness was significantly higher after the training than before (*p* < 0.001). This was consistent with our expectations. On the career intentions item, there was no significant change from pretest to posttest: participants expressed about the same level of career intentions (i.e., intentions to stay in the Navy for 20 years) after the training as before.

DISCUSSION

The key objectives of this study were to assess corpsmen participants’ satisfaction with highly realistic training and to determine the training’s impact on participants’ self-efficacy, readiness, and career intentions. Corpsmen participants expressed high levels of satisfaction with the training overall and with specific elements of the training. Most of the participants reported that the training strengthened their confidence about being successful corpsmen and about their ability to provide medical care under pressure. When asked what they liked best about the training, the most common responses were the use of live actors, cut suits, opportunity to practice hands-on medical procedures, and realistic environment. In response to the question, “What suggestions do you have for improving the training?,” the most common themes were that that the training should be longer, with more scenarios and actors, and that more medical supplies should be provided (Table 4).

Comparisons of pretest and posttest surveys revealed that participants’ levels of general, occupational, and task-specific self-efficacy, as well as perceived readiness were significantly higher after the training than before. These results suggest that highly realistic training had a positive impact on participants. Although we cannot rule out the possibility that the participants’ other experiences affected their posttest scores, it seems likely that the training itself contributed substantially to the observed elevations in self-efficacy and readiness.

Overall, the results of this study revealed that participants expressed high levels of satisfaction with highly realistic training. Additionally, the study provided evidence that highly realistic training improved corpsmen students' self-efficacy and sense of readiness. The strongest effect was found for task-specific self-efficacy, which involves confidence about performing specific hands-on medical procedures. Considered together, training satisfaction and pretest–posttest results suggest that the training was both effective and well-received by the participants. Although no objective measures of performance were available, the results are promising.

In conclusion, highly realistic training seems to be an effective way to train and prepare Navy corpsmen for operational settings. The use of simulation training methods, such as highly realistic training, may ultimately result in corpsmen who are better able to deliver high-quality medical care in a variety of settings (e.g., combat zones). Moreover, the use of highly realistic, immersive training and other effective simulation training methods is consistent with the goal of the Department of Defense to phase out the use of live animals in medical training (House of Representatives, 2013). In light of the military's goal of finding effective alternatives to live tissue training, it is reassuring that highly realistic training appears to be an effective way to train corpsmen.

In recent years, all military services have transitioned into using more realistic and immersive methods for training military medical care providers. The Navy has only recently implemented the use of highly realistic training for corpsmen. To our knowledge, this project and a related project by our research team (Booth-Kewley & McWhorter, 2014) are among the first to implement and evaluate highly realistic training for Navy corpsmen. In light of evidence that highly realistic training has a positive impact on corpsmen, it may be beneficial to extend the training to other groups of military medical providers (e.g., physicians, nurses). Highly realistic training could also be used to help newly formed military medical teams (e.g., physicians, nurses and corpsmen) learn to function smoothly and cohesively as a team. Future research should seek to improve highly realistic training and assess its impact on medical performance. Additionally, future research should also examine the impact highly realistic training has on psychosocial outcomes, such as resilience.

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Table 1. Participants' Ratings of the Training: Overall and Specific Aspects

| Rated Item | Poor/Fair ^a | Satisfactory | Good | Excellent | Mean Rating |
|----------------------------|------------------------|--------------|-------|-----------|-------------|
| Training overall | 3.4% | 15.5% | 36.7% | 44.3% | 4.21 |
| Shipboard setting(s) | 6.4% | 20.8% | 33.6% | 39.2% | 4.04 |
| Field setting(s) | 4.9% | 11.7% | 37.4% | 46.0% | 4.24 |
| Use of actors/role players | 2.6% | 9.1% | 29.1% | 59.2% | 4.44 |
| Cut suit technology | 2.6% | 9.8% | 30.2% | 57.4% | 4.42 |
| Special effects | 10.6% | 8.4% | 23.2% | 57.8% | 4.23 |
| Sense of realism | 9.6% | 16.0% | 31.3% | 43.1% | 4.05 |

Note. Participants were asked: "Please rate how much you liked the training and specific parts of the training."

^aResponses of "poor" and "fair" were combined.

N = 265.

Table 2. Participants' Perceptions of Training Benefits

| Survey Item | Not at all/ Somewhat ^a | Moderately | Very | Extremely | Mean Rating |
|---|--------------------------------------|------------|-------|-----------|----------------|
| Your overall confidence about being a successful IDC | 5.3% | 9.1% | 36.7% | 48.9% | 4.28 |
| Your ability to perform in an operational environment | 5.7% | 13.7% | 32.8% | 47.7% | 4.20 |
| Your ability to provide medical care under pressure | 5.3% | 10.6% | 33.0% | 51.1% | 4.29 |
| Your TCCC skills | 6.8% | 22.7% | 28.0% | 42.4% | 4.03 |
| Your higher-level IDC skills | 3.4% | 12.5% | 35.2% | 48.9% | 4.30 |

Note. Participants were asked: "To what degree did the training benefit...?" IDC = Independent

Duty Corpsman, TCCC = Tactical Combat Casualty Care.

^aResponses of "not at all" and "somewhat" were combined.

N = 265.

Table 3. Responses to Other Items Assessing Satisfaction With the Training

| Survey Item | Disagree ^a | Neutral | Agree | Strongly Agree | Mean Rating |
|--|--------------------------------------|------------|-------|----------------|-------------|
| I really enjoyed the training and would like to participate in additional trainings like it. | 4.6% | 14.4% | 28.0% | 53.0% | 4.27 |
| The training was a good test of my overall IDC skill set. | 7.2% | 16.7% | 34.8% | 41.3% | 4.10 |
| The training has given me a sense of accomplishment. | 11.7% | 26.5% | 27.7% | 34.1% | 3.80 |
| | Not at all/ Somewhat ^b | Moderately | Very | Extremely | Mean Rating |
| Did the training strengthen your confidence about your ability to provide medical care? | 5.3% | 8.7% | 36.2% | 49.8% | 4.28 |
| Do you think the training will help you provide better care as an IDC? | 3.0% | 6.4% | 29.1% | 61.5% | 4.48 |

^aResponses of “strongly disagree” and “disagree” were combined.

^bResponses of “not at all” and “somewhat” were combined.

N = 265.

Table 4. Responses to Open-Ended Survey Items (Representative Comments)

What Participants Liked Most About the Training

Instructor feedback, cut suits, and being able to see and actually do treatments on real breathing people.

The ability to work on a patient who can speak to you and show emotions.

Actually being able to perform medical procedures on the cut suits (i.e., chest tubes).

I love the cut suits. It gives you a sense of performing procedures on actual casualties instead of a mannequin. The amputee patients made the experience realistic as well.

Live actors and the realism of each scenario.

Special effects (explosions, smoke).

Ability to perform emergency procedures with the cut suits, i.e., chest tubes, cricothyrotomy.

Working with actual amputees and being able to see the effects of your medical treatment.

Being hands-on with a role-playing patient, providing treatment with oversight, getting the feedback as treatment goes from start to finish.

Instead of always asking what is wrong with the patient, you can clearly see it—it is more life-like.

The realistic environment, actors, special effects, and cut suits.

Being able to apply the procedures we learned in class.

Table 4. (continued)

| Participants' Suggestions for Improving the Training |
|---|
| <i>More noise, bigger explosions, etc.</i> |
| <i>Apply longer timelines and scenarios. Extend a scenario to reflect a full day of operation.</i> |
| <i>Increase the medical supplies and lengthen the whole program by a few days.</i> |
| <i>Refine the cut suit a bit for tape cohesion and anatomy.</i> |
| <i>Include some live tissue training.</i> |
| <i>More shipboard scenarios.</i> |
| <i>Add variations to scenarios, like add an extra patient halfway through or have a responder go down.</i> |
| <i>Make scenarios longer with realistic timelines of effective treatment.</i> |
| <i>Add more people (actors) in the towns.</i> |
| <i>More supplies.</i> |
| <i>Smaller groups of students and more time to complete the training, maybe in a 5-day period.</i> |
| <i>Faster pacing between scenarios would increase the stress level, which could be a good way to see exactly how far we can push ourselves.</i> |
| <i>Add enemy combatants and civilian casualties, including women and children.</i> |
| <i>More supplies, more teaching on site, more hands-on.</i> |
| <i>More patients per IDC; more days.</i> |

Table 5. Impact of the Training: Comparison of Pretest and Posttest Scores

| Scale | Pretest Score | Posttest Score | Paired <i>t</i> test | Significance |
|-----------------------------|---------------|----------------|----------------------|-----------------|
| General self-efficacy | 41.46 | 42.08 | -1.92 | <i>p</i> = .056 |
| Occupational self-efficacy | 37.59 | 39.56 | -5.12 | <i>p</i> < .001 |
| Task-specific self-efficacy | 110.36 | 129.06 | -16.07 | <i>p</i> < .001 |
| Perceived readiness | 28.19 | 29.23 | -3.96 | <i>p</i> < .001 |
| Career intentions | 4.57 | 4.53 | 0.56 | <i>p</i> = .558 |

N = 227.

REPORT DOCUMENTATION PAGE

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